Hybrid Revascularization: Simultaneous vs. Staged

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Boston University School of Medicine
Quality of Life after CABG vs. PCI
Results from the Syntax Trial

SF-36 – PHYSICAL

SF-36 – MENTAL

Cohen et al, ACC meeting, 3/09
Minimally Invasive Surgical Revascularization

Bilateral IMA grafting without a sternotomy
MVST: Bilateral *In Situ* IMA Grafts

Small thoracotomy

Postoperative angiography
MVST: LIMA-RIMA Composite Graft

Creating the LIMA-radial composite graft
Hybrid Coronary Revascularization: Minimally Invasive CABG + PCI

• “Best of both worlds”: IMA + benefits of minimally invasive
Hybrid Coronary Revascularization: Minimally Invasive CABG + PCI

- “Best of both worlds”: IMA + benefits of minimally invasive
- Expands minimally invasive CABG
Hybrid Coronary Revascularization: Minimally Invasive CABG + PCI

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- Expands PCI (e.g. protected LM)
Hybrid Coronary Revascularization: Minimally Invasive CABG + PCI

• “Best of both worlds”: IMA + benefits of minimally invasive
• Expands minimally invasive CABG
• Expands PCI (e.g. protected LM)
• Angiographic confirmation of grafts
Hybrid: Logistics

- PCI 1<sup>st</sup>, then CABG
- Surgery 1<sup>st</sup>, then PCI

- Simultaneous
  - hybrid OR
Hybrid: Logistics

PCI 1\textsuperscript{st}, then CABG

– Surgery 1\textsuperscript{st}, then PCI

Simultaneous

• hybrid OR

Feasibility, efficacy and safety of these three approaches
Hybrid Patient Enrollment: 3/1/06 to present

- Multivessel CAD; Referred for CABG (n=449)
  - Suitable anatomy
  - Able to tolerate single lung ventilation
  - Stable hemodynamics
  - Yes → Minimally invasive CABG (n=302)
  - No → Sternotomy CABG (n=147)

Minimally invasive CABG (n=302)

- Hybrid CABG (n=55)
  - Culprit lesion graftable?
    - Yes → Staged hybrid: CABG 1st (n=20)
    - No → Staged hybrid: PCI 1st (n=20)

- Multivessel CABG (n=241)
  - No  → Simultaneous hybrid (n=15)

Conversions (n=6)
Hybrid Patient Enrollment: 3/1/06 to present

Multivessel CAD; Referred for CABG (n=449)

Suitable anatomy
Able to tolerate single lung ventilation
Stable hemodynamics

Yes

Minimally invasive CABG (n=302)

Sternotomy CABG (n=147)

No

Conversions (n=6)

Hybrid CABG (n=55)

Staged hybrid: CABG 1st (n=20)

Culprit lesion graftable?

Yes

Staged hybrid: PCI 1st (n=20)

No

Simultaneous hybrid (n=15)

No

Multivessel CABG (n=241)
# PATIENT POPULATION

<table>
<thead>
<tr>
<th></th>
<th>CABG 1&lt;sup&gt;st&lt;/sup&gt;</th>
<th>PCI 1&lt;sup&gt;st&lt;/sup&gt;</th>
<th>Simultaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td>62.8 ± 9.1</td>
<td>64.4 ± 10.3</td>
<td>63.9 ± 10.1</td>
</tr>
<tr>
<td>Chronic Lung Disease</td>
<td>11%</td>
<td>10%</td>
<td>13%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>48%</td>
<td>45%</td>
<td>51%</td>
</tr>
<tr>
<td>PVD</td>
<td>28%</td>
<td>26%</td>
<td>25%</td>
</tr>
<tr>
<td>Mean LVEF (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good (&gt;50%)</td>
<td>62%</td>
<td>62%</td>
<td>55%</td>
</tr>
<tr>
<td>Moderate (35-50%)</td>
<td>20%</td>
<td>23%</td>
<td>27%</td>
</tr>
<tr>
<td>Poor (&lt;35%)</td>
<td>18%</td>
<td>15%</td>
<td>18%</td>
</tr>
<tr>
<td>Number of Diseased Vessels</td>
<td>2.8 ± 0.5</td>
<td>2.7 ± 0.4</td>
<td>2.9 ± 0.8</td>
</tr>
<tr>
<td>Left Main Disease</td>
<td>39%</td>
<td>33%</td>
<td>43%</td>
</tr>
<tr>
<td>Congestive Heart Failure</td>
<td>13%</td>
<td>16%</td>
<td>19%</td>
</tr>
<tr>
<td>Logistic EuroSCORE: (%)</td>
<td>7.1 ± 5.2</td>
<td>7.7 ± 5.4</td>
<td>7.2 ± 6.5</td>
</tr>
<tr>
<td></td>
<td>CABG 1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>PCI 1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>Simultaneous</td>
</tr>
<tr>
<td>-------------------</td>
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<tr>
<td>IMA to LAD (%)</td>
<td>20 (100)</td>
<td>20 (100)</td>
<td>15 (100)</td>
</tr>
<tr>
<td>RIMA graft (%)</td>
<td>12 (60)</td>
<td>11 (55)</td>
<td>7 (47)</td>
</tr>
<tr>
<td>Coronary stents (#/pt)</td>
<td>1.9</td>
<td>1.7</td>
<td>1.8</td>
</tr>
<tr>
<td>SVG</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
## Results – *Perioperative Outcomes*

<table>
<thead>
<tr>
<th></th>
<th>CABG 1(^{st})</th>
<th>PCI 1(^{st})</th>
<th>Simultaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Surgery (hr)</td>
<td>4.8 ± 1.2</td>
<td>4.7 ± 0.9</td>
<td>5.0 ± 1.2</td>
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<tr>
<td>Hospital LOS (day)</td>
<td>3.72 ± 1.5</td>
<td>3.55 ± 2.3</td>
<td>3.67 ± 2.2</td>
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<tr>
<td>ICU LOS (hr)</td>
<td>21.9 ± 7.3</td>
<td>20.6 ± 10.2</td>
<td>24.4 ± 17.3</td>
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<tr>
<td>Intubation Time (hr)</td>
<td>4.80 ± 6.4</td>
<td>5.52 ± 6.3</td>
<td>4.6 ± 8.3</td>
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<tr>
<td>Intraoperative Blood Loss (ml)</td>
<td>347 ± 166</td>
<td>330 ± 145</td>
<td>378 ± 225</td>
</tr>
<tr>
<td>PRBC Transfusion (unit)</td>
<td>0.46 ± 0.37</td>
<td>0.67 ± 0.35</td>
<td>0.53 ± 0.35</td>
</tr>
</tbody>
</table>
Quality of Life after CABG vs. PCI

Hybrid Results vs. Syntax Trial

SF-36 – PHYSICAL

SF-36 – MENTAL

Cohen et al, ACC meeting, 3/09
Antithrombotic Management

- **PCI 1<sup>st</sup>**
  - Plavix 600 mg load, 75 mg/d
  - Aspirin

- **CABG 1<sup>st</sup>**
  - Aspirin alone

- **Simultaneous**
  - Plavix 300 mg per NGT intraop, 75 mg/d
  - Aspirin
Bleeding After Hybrid

Chest Tube Output
- PCI 1st
- CABG 1st
- Simultaneous

TIMI Bleeding Score
- PCI 1st
- CABG 1st
- Simultaneous

Hct decline at 24 hours (%)

* TIMI major bleeding

* p<0.05, TIMI Major Bleeding, Fisher exact
Plavix and Bleeding

TIMI Bleeding Score

Hct decline at 24 hours (%)

PCI 1st  CABG 1st  Simultaneous  Sternotomy

TIMI major bleeding
Conclusions

- **Feasible**: Hybrid revascularization is suitable for typical CABG referrals
- **Effective**: Early recovery of QOL appears favorable
- **Safe**: Bleeding is not influenced by hybrid logistics
  - Surgery 1\textsuperscript{st}, PCI 1\textsuperscript{st}, simultaneous
  - Platelet ADP inhibition increases risk of “outliers”